ATMOSPHERIC PRESSURE (expressed in inches and hundredths).

The distribution of mean atmospheric pressure for November, 1890, as determined from observations taken daily at 8 a. m. and 8. p. m. (75th meridian time), is shown on chart II by isobars. The departure of the mean pressure for November, 1890, obtained from observations taken twice daily at the hours named, from that determined from hourly observations, varied at the stations named below, as follows:

Station.	Departure.	Station.	Departure.
Eastport, Me	+.008	Duluth, Minn	+.004
Boston, Mass	+.012	New Orleans, La	+.004
New York City	+.011	Memphis, Tenn	.000
Philadelphia, Pa	+.009	Saint Louis, Mo	.000
Washington City	+.010	Santa Fé, N. Mex	−.006
Savannah, Ga	+.009	Denver, Colo	−.002
Buffalo, N. Y	+.011	Fort Assinniboine, Mont	−.009
Detroit, Mich	+.009	Salt Lake City, Utah	−.005
Chicago, Ill	+.004	San Francisco, Cal	−.016
Cincinnati, Ohio	+.007	San Diego, Cal	−.015

The mean pressure was highest from east Washington southeastward to east Colorado, where it was above 30.25, whence it decreased to less than 30.05 on the south Pacific coast and over the southwest part of the southern plateau, southeastward to less than 30.15 along the immediate Gulf coast, eastward to less than 29.90 in the lower Saint Lawrence valley, and northward to less than 30.00 in the Saskatchewan Valley.

A comparison of the pressure chart for November with that of the preceding month shows an increase in mean pressure over the entire country, the increase being most marked over the Rocky Mountain and northern and middle plateau regions and thence eastward to the Red River of the North and lower Missouri valleys and west Texas, where it exceeded .15. From this region the increase became less marked westward to the immediate middle and south Pacific coasts, where it was less than .10, and eastward to the north part of the upper lake region and the lower Saint Lawrence valley, where it was less than .05. The increase was also less than .05 over south Florida. The area of high pressure which covered Oregon, north Nevada, and northwest Utah in October extended southeastward, with an increase in mean pressure of about .15. Within the area of low pressure which extended over east Nova Scotia and Cape Breton Island in October there was an increase of about .10. In the Saskatchewan Valley the increase ranged from .05 to .10, and on the extreme south Pacific coast and in the lower Colorado valley the mean pressure was .10 to .13 higher than for October.

The mean pressure was above the normal, save from the valley of the Red River of the North southeastward over the Lake region and the middle Atlantic states and eastward over the Saint Lawrence Valley, New England, and the Canadian Maritime Provinces, and along the immediate Pacific coast south of the 40th parallel. The greatest departures above the normal pressure were noted in east Washington, where they exceeded .15, and the most marked departures below the normal pressure occurred in the Saint Lawrence Valley and in Nova Scotia and New Brunswick, where they were more than .05. At Key West, Fla., the mean pressure was normal.

The monthly barometric ranges at regular stations of the Signal Service are shown in the table of Signal Service data on the last two pages of the REVIEW.

AREAS OF HIGH PRESSURE.

Seven areas of high pressure were observed within or near the limits of stations of observation during the month of November. Five of these areas of high pressure apparently formed over the Rocky Mountain regions, and after remaining almost stationary during the time covered by two or more telegraphic reports, they moved first to the southeastward towards the Mississippi Valley, from which region the direction of movement was slightly to the north of east until the area passed beyond the Atlantic coast line when the southeasterly movement was resumed. Five of the observed areas reached the Atlantic coast and one was first observed on the north Pacific. The region of greatest frequency includes the eastern and middle slopes of the Rocky Mountains, which is about one thousand miles to the southwest of the region of greatest frequency of areas of low pressure.

The following is a general description of the weather conditions attending each area of high pressure as obtained from the regular telegraphic reports.

I.—On the 1st of the month the barometric pressure was abnormally high over the Rocky Mountain regions, the centre of greatest pressure being in northern Washington. The pressure was also above the normal throughout the Southern States, due to the preceding area of high pressure which was attended by frosts on the morning of the 1st as far south as northern Florida. A storm of marked energy prevailed over the Lake region, the centre being near to and north of Lake Superior. This general distribution of pressure continued until the morning of the 2d, when the centre of high pressure had advanced eastward to Montana and the area covered the entire country west of the 100th meridian. The storm in the Lake region had increased in energy, while its easterly movement had been retarded. Strong westerly gales prevailed throughout the Lake region, and high northwesterly winds were reported in the Missouri Valley. After the morning of the 2d the direction of movement of this high area changed to the southward, and it passed rapidly over the eastern slope of the Rocky Mountains to Texas where it was central on the 3d, and it was last traced on the morning of the 4th over the lower Rio Grande valley, the weather being clear and cold throughout the Southern States, and killing frosts were reported as far south as Mobile, Ala.

II.—Was observed in the region north of Montana on the afternoon of the 6th, although the pressure had been above the normal in the region north of Minnesota on the previous day, and the reports indicate that an area of high pressure passed eastward north of the stations of observation during the 5th and 6th. This area passed southeastward to the upper Missouri valley during the night of the 6th, and thence eastward over the upper lake region, the pressure increasing at the centre during the easterly movement. It passed north of the lower lake region during the 8th, crossed the lower Saint Lawrence valley, and reached the New England coast on the 9th. Although the pressure increased with the easterly movement, it became more contracted as it approached the coast, moving with an unusually high velocity, and only its western margin was observed on the afternoon of the 9th, covering eastern Nova Scotia.

III.—Formed over the eastern and central slopes of the Rocky Mountains on the 9th, the barometric pressure being above the normal over the north Pacific coast and the central plateau region. It moved eastward, covering the entire Mississippi Valley on the 10th, and the greater portion of the country east of the Mississippi Valley during the 11th. It was apparently re-enforced from the Hudson Bay region on the afternoon of the 10th, and moved slowly southward during the 11th, reaching the middle Atlantic coast on the morning of the 12th, after which it apparently disappeared by a gradual decrease of pressure.

IV.—Was first observed on the Pacific coast on the morning of the 11th, although the pressure had been above the normal in that region during the 9th and 10th. It increased from 30.44 to 30.60 at Portland, Oregon, during the night of the 10th. It moved to the northeast until after the centre passed the coast line, and thence to the southeast to southern Idaho, where it remained almost stationary for twenty-four hours, but the reports indicate that the weather conditions over the entire region south of the Missouri Valley during the 12th and 13th

resulted from the influence of this area over that section. During the 13th this area passed northwestward over the north Pacific coast, and on the succeeding day it resumed its southeasterly movement, passing from British Columbia to northern Colorado during the 14th. After reaching Colorado it moved directly eastward, passing slowly over the eastern slope of the Rocky Mountains and very rapidly over the Mississippi Valley and Lake region. On the morning of the 16th it covered the districts on the Atlantic coast and the greater portion of the Lake region, the centre being over Lake Ontario. From this region it passed southeastward over the Atlantic, disappearing during the 17th.

V.—Formed over the plateau region during the 16th and moved slowly eastward, reaching the eastern slope of the Rocky Mountains by the morning of the 19th, when it was central in eastern Colorado, and covered the greater portion of the United States, the only section not within its limits being the Saint Lawrence Valley, New England, and the east portion of the Lake region. It moved slowly to the southeastward during the 19th, reaching the lower Mississippi valley on the 20th, where it apparently disappeared by gradual decrease of pressure.

VI.—This area also formed over the plateau region, and was first observed as central over northern Nevada on the afternoon of the 20th. It apparently resulted from the cold air which remained over the Rocky Mountain region after the preceding area of high pressure had moved southeastward to the Mississippi Valley. It moved rapidly northeastward to the upper Missouri valley during the night of the 20th, where it was apparently re-enforced from the north, after which it moved rapidly southward over the eastern slope of the Rocky Mountains, reaching northern Texas on the morning of the 23d. At this point the direction of movement changed to the east, and, as the centre approached the coast, to the northeast. The area was last observed on the morning of the 24th as central in southern Virginia, and including within its limits the Atlantic coast states from New England to Florida; it disappeared during the 24th.

VII.—As in the preceding case, high area VII formed over the plateau region as a secondary, while the principal area of high pressure covered the eastern slope of the Rocky Mountains. It was observed on the 23d over Nevada, and moved northeastward to Montana where it was central on the 25th. From Montana it moved southeastward to Kansas, being well defined and embracing within its limits the greater portion of the United States. During the 26th the centre of greatest pressure moved to the westward, and this area remained in the central Rocky Mountain region from the 27th to the close of the month, moving first slowly to the northwest, reaching southern Idaho on the 28th, and afterwards to the south, reaching northern New Mexico at the last telegraphic report of the month.

AREAS OF LOW PRESSURE.

Twelve areas of low pressure were observed within or near the limits of stations of observation during the month of November, the mean track of these disturbances being farther to the north than usual. The region of greatest storm frequency was to the north of Lake Superior, over which the centres of eight disturbances were traced. Three depressions passed from the Missouri Valley over the lower lake region; two reached the Atlantic on the north New England coast, and only one could be clearly traced from the Pacific coast. By reference to chart I it will be seen that all depressions passed to the north of the Ohio Valley, and that none reached the Atlantic coast south of New England.

The following is a general description of the more important weather conditions observed during the transit of these disturbances over the field of observation:

I, II, and III.—This storm was partially described in the preceding REVIEW. It apparently originated in the region north of Montana, and at the first telegraphic report of the current month it was central north of and near Lake Superior as a storm of great extent and considerable energy. The barometric gradient was well marked to the south and west, a belt of high pressure extending from the middle and south Atlantic coasts westward to the Rocky Mountains and thence northward to British Columbia. This storm moved southeastward to the upper Saint Lawrence valley, which it reached on the afternoon of the 2d, when its course changed to the northeast, and it moved rapidly down the Saint Lawrence Valley, disappearing east of the Maritime Provinces on the 3d. It increased in energy during its southeasterly movement, and the attending westerly gales in the Lake region, which were accompanied by freezing weather and light snow, were unusually severe. The depression traced as number II on chart I formed as a secondary disturbance in the region north of North Dakota during the 2d, when the principal disturbance covered the Saint Lawrence Valley. It moved eastward north of Lake Superior, attended by general snows and strong westerly winds in the Lake region, but lost energy during its easterly movement, and could not be traced on the telegraphic weather chart farther to the east than the upper Saint Lawrence valley, and its disappearance was doubtless due to the rapid advance of low area III, which was first observed in the region north of North Dakota on the 4th, and which moved southeastward towards Lake Superior, apparently reaching its maximum intensity while passing over Manitoba, where the barometer fell to 29.20 on the afternoon of the 4th. By the morning of the 5th the centre was near to, and directly north of, Lake Superior, and, although strong southwesterly gales occurred on Lakes Michigan and Superior during the night, the pressure was increasing at the centre of disturbance, and by the afternoon of the 5th this low area had disappeared from the field of observation, attended, however, by strong southwesterly gales in the lower Saint Lawrence valley. The three disturbances above referred to were at no time central within the limits of stations of observation, and they passed rapidly eastward to the north of the Lake region, the barometric pressure remaining below the normal over the region covered by the tracks of the low areas, there being no intervening area of high pressure.

IV and V.—Formed on the eastern slope of the Rocky Mountains over Indian Territory on the 6th, and in the eastern extremity there was a barometric trough which extended westward to the Pacific coast. An area of high pressure existed to the north in the Dakotas and the adjoining states, which apparently forced this trough of low pressure to the southward, and during the 6th the flow of cold air from the north over the Rocky Mountain region resulted in the formation of two depressions, one of which has been traced as number IV and the other as number V on chart I. The disturbance which formed to the east of the Rocky Mountains moved rapidly to the northeastward over the Lake region during the 6th and 7th, attended by light rains in the central valleys and Lake region. It increased in intensity until the centre reached the lower Saint Lawrence valley on the 8th, the southerly gales being unusually severe in that section. Reports indicate that the course of this storm changed to the eastward after reaching the Atlantic. The area of low pressure traced as number V was central over southern California on the morning of the 7th, and its movement eastward from that region can be readily traced from the regular telegraphic reports. It crossed the Rocky Mountains during the 8th, attended by general snow from Colorado eastward to the Missouri Valley, and rain from northern Texas eastward over the central valleys. Its movement was unusually rapid during the 8th, and by the morning of the 9th the centre had reached Lake Superior, and the storm conditions covered the Northern States. General rains were reported in the Lake region, northern New York, and northern New England, heavy snows near Lake Superior, and a cold wave of limited area in the Missouri Valley on the morning of the 9th. The northeasterly course of this storm continued until the morning of the 10th, when its centre was located to the northeast of Anticosti Island, Gulf

of Saint Lawrence, and southerly gales were reported from the southern portions of Newfoundland.

VI.—This depression appeared to the north of Montana on the 10th, and although it caused no marked change in the weather conditions within the limits of the United States, its movement eastward can be readily traced from the regular telegraphic weather charts until the morning of the 12th when the centre of disturbance was located far to the north of Lake Superior. As in the case of number II, the disappearance of this area was probably due to the formation of a second disturbance to the westward, which, however, was so far to the north as to render it impossible to definitely locate the centre of disturbance from the regular telegraphic reports.

VII.—The a. m. report of the 14th exhibited a barometric trough covering the eastern slope of the Rocky Mountains, and the direction and force of wind indicated that a disturbance was forming over Kansas and Nebraska. The advance of an area of high pressure from the northwest forced the trough of low pressure to the southeastward, causing general rains throughout the central valleys, the rainfall being unusually heavy from Texas northward over Kansas, where the wind shifted quickly to the north, attending a sharp fall in temperature. This storm apparently formed in the lower Rio Grande valley and moved parallel to the west Gulf coast, reaching the vicinity of Galveston, Tex., on the 16th. The trough of low pressure covered the central valleys, and a secondary disturbance formed over Missouri on the afternoon of that date, the original disturbance disappearing while central over Louisiana. The secondary disturbance moved eastward over the Lake region during the 17th, and reached the New England coast on the 18th, the pressure decreasing at the centre during the easterly movement, the minimum pressure observed being 28.90 at Cape Race, Newfoundland, on the 18th.

VIII.—This storm developed in the region north of Montana when the preceding disturbance covered the Lake region. It moved rapidly eastward, inclining toward the Lake region, during the 17th and 18th, without causing any marked change in the weather conditions. It crossed the lower Saint Lawrence valley on the 19th and developed great energy after reaching the coast of Nova Scotia. It apparently changed direction to the northeast during the 20th, and was last observed as central near Sydney, C. B. I., on the afternoon of that date, when the barometer indicated a pressure of 29.18.

IX.—Developed in the region north of Montana on the 19th and moved eastward north of the stations of observation during the two succeeding days, following the same general course as that given for the preceding area of low pressure until the centre reached the Saint Lawrence Valley. This disturbance increased in energy during its easterly movement, and, as in the preceding case, caused no marked changes in the general fair weather conditions which prevailed over the United States.

X.—This depression also developed in the region north of Montana, it being first observed in that region on the morning of the 21st. It moved eastward, inclining toward the Lake region during the 23d and 24th, apparently reaching its maximum energy while passing north of Lake Superior. Strong westerly winds were reported from the Lake region on the 24th, but, as in the preceding cases, the weather remained generally fair over the greater portion of the United States. After reaching the Saint Lawrence Valley on the 25th light snows occurred in northern New England and northern New York, but the weather remained generally fair over the remaining portions of the country. This storm disappeared to the northeast of the Maritime Provinces on the 26th, and was followed by a second disturbance during the 27th and 28th, the track of which is not given on chart I, as the centre of disturbance was so far to the north that its movements could not be definitely determined.

XI.—Apparently developed to the west of Hudson Bay during the 29th and passed southeastward to the Saint Lawrence Valley, where it changed direction to the north of east, it being located as central near Anticosti Island, Gulf of Saint Lawrence, at the close of the month.

XII.—Apparently developed north of western Montana on the 29th. It moved southeastward, following the general course of the Missouri Valley, and reached northern Iowa at the close of the month, attended by a trough of low pressure which extended from the upper lake region to the Rocky Mountains, the weather remaining clear to the south and west of the disturbance, while general snows were reported from the upper lake region.

Tabulated statement showing principal characteristics of areas of high and low pressure.

Barometer.	First observed.			Last observed.		Duration.	Velocity per hour.	Maximum pressure change and maximum abnormal temperature change in twelve hours and maximum wind velocity.									
	Date.	Lat. N.	Long. W.	Lat. N.	Long. W.			Station.	Rise.	Date.	Station.	Fall.	Date.	Station.	Direction.	Miles per hour.	Date
High areas.		°	°	°	°	*Days.*	*Miles.*		*Inch.*			°					
I	1	47	117	27	100	3.0	30	Grand Haven, Mich	.38	2	Keokuk, Iowa	18	2	Huron, S. Dak	n.	30	2
II	6	53	113	46	65	2.5	45	Quebec, Quebec	.62	8	Northfield, Vt	26	8	Fort Buford, N. Dak	nw.	26	7
III	9	39	102	42	75	3.0	26	Rockliffe, Ont	.62	10	Chicago, Ill	26	9	Cheyenne, Wyo	n.	32	9
IV	11	44	128	34	70	6.0	30	Omaha, Nebr	.36	15	Fort Custer, Mont	17	11	Helena, Mont	sw.	34	14
V	16	39	115	35	86	4.5	19	do	.24	19	Indianapolis, Ind	20	17	Pensacola, Fla	ne.	26	20
VI	20	42	116	38	78	3.5	45	Fort Buford, N. Dak	.58	21	Saint Louis, Mo	17	22	Dodge City, Kans	n.	32	21
VII	23	41	114	37	106	7.5	16	Port Arthur, Ont	.56	25	Omaha, Nebr	22	25	Fort McKinney, Wyo	n.	26	25
Mean						4.3	30		.48			21				29	
Low areas.									Fall.			Rise.					
I	1	49	87	49	65	2.0	30	Cleveland, Ohio	.42	1	Nashville, Tenn	15	1	Chicago, Ill	sw.	44	1
II	2	55	105	50	77	1.5	39	Moorhead, Minn	.56	3	Dodge City, Kans	26	3	Grand Haven, Mich	n.	44	4
III	4	54	103	50	87	1.0	35	do	.58	4	Huron, S. Dak	28	4	Chicago, Ill	sw.	46	5
IV	6	36	99	50	67	2.0	42	Father Point, Quebec	.56	7	Father Point, Quebec	20	7	Sydney, C. B. I	w.	40	8
V	7	34	115	50	59	3.0	48	Alpena, Mich	.66	9	Oklahoma City, Okla. T.	25	8	Chicago, Ill	se.	44	8
VI	10	54	111	52	87	2.0	23	White River, Ont	.24	11	Saint Vincent, Minn	16	11	Fort Assinniboine, Mont.	w.	30	11
VII	14	26	100	31	93	2.0	14	Corpus Christi, Tex	.22	14	Louisville, Ky	17	14	Galveston, Tex	nw.	36	16
VIIa	16	37	94	47	57	2.0	49	Albany, N. Y	.54	17	Cincinnati, Ohio	22	17	Boston, Mass	w.	42	18
VIII	17	53	104	47	58	3.5	31	Sydney, C. B. I	.38	20	Huron, S. Dak	16	17	New York City	w.	38	20
IX	19	55	113	50	62	4.5	30	Kingston, Ont	.38	21	Cleveland, Ohio	19	21	do	nw.	42	22
X	23	56	107	52	60	3.0	30	Rockliffe, Ont	.48	24	Eastport, Me	21	25	Buffalo, N. Y	sw.	40	25
XI	29	52	92	49	63	1.5	41	Green Bay, Wis	.32	29	Des Moines, Iowa	13	29	Grand Haven, Mich	n.	36	30
XII	29	51	115	42	94	1.0	50	Bismarck, N. Dak	.46	30	Omaha, Nebr	20	30	Fort Assinniboine, Mont.	sw.	38	30
Mean						2.2	36		.45			20				40	